

CLAIMS:

I claim:

1. An apparatus for removing deposits from the internal surface of a substantially cylindrical tube having a tube axis, the apparatus comprising:

a cap adapted for attachment to a first end of the tube, the cap defining a hole;

a shaft slidably and rotatably mounted in the hole and having a shaft axis;

a plurality of sockets at an inside end of the shaft, spaced about an exterior of the shaft, each socket extending outward from the shaft axis;

a cutter base slidably mounted in each socket, each cutter base movable from a retracted position wherein a minimum length of cutter base extends from the socket, to an extended position;

a conduit through the shaft adapted at an outside end thereof for attachment to a pressurized fluid source, an inside end thereof operatively connected to a lower portion of each socket such that the cutter base moves to the extended position in response to a force exerted by a supplied pressurized fluid;

a cutter attached to an outer end of each cutter base; and

a drive operative to rotate the shaft as the shaft slides along the hole.

2. The apparatus of Claim 1 further comprising a channel defined by the apparatus adapted at an outside end of the channel for attachment to a pressurized fluid source, an inside end thereof supplying pressurized fluid to an interior of a tube.

3. The apparatus of Claim 2 wherein the cap is adapted to substantially cover the first end of the tube such that the pressurized fluid exits the tube through an opposite second end of the tube.

4. The apparatus of Claim 3 wherein the channel is defined by the cap.

5. The apparatus of Claim 2 wherein the channel is provided by the conduit and by an orifice connecting the conduit to an exterior of an inner portion of the shaft.

6. The apparatus of Claim 5 further comprising a plurality of orifices, each orifice located adjacent to a cutter and adapted to direct pressurized fluid outward from the shaft.

7. The apparatus of Claim 1 further comprising a cutter mounting member mounted on the inside end of the shaft, the cutter mounting member defining the sockets and a connection from the lower portion of each socket to the conduit.

8. The apparatus of Claims 5 further comprising a cutter mounting member mounted on the inside end of the shaft, the cutter mounting member defining the sockets, a connection from the lower portion of each socket to the conduit, and the orifice.
9. The apparatus of Claim 1 wherein the cutters are offset along the axis of the shaft.
10. The apparatus of Claim 1 wherein at least one cutter comprises a circular member rotatably mounted about a cutter axis generally parallel to the shaft axis.
11. The apparatus of Claim 10 wherein the circular member is a circular blade having a sharpened periphery.
12. The apparatus of Claims 10 wherein the circular member has a notched outer periphery.
13. The apparatus of Claim 1 wherein the cutters are equally spaced about the exterior of the shaft.
14. The apparatus of Claim 1 further comprising a feed drive for advancing the cutters through the tube.
15. The apparatus of Claim 1 wherein the cap is adapted for attachment to the first end of the tube using a clamp.

16. An apparatus for removing deposits from the internal surface of a substantially cylindrical tube having a tube axis, the apparatus comprising:

a cap adapted for attachment to a first end of the tube, the cap defining a hole;

a shaft slidably and rotatably mounted in the hole and having a shaft axis;

a plurality of cutters extending outward from an inside end of the shaft, spaced about the exterior of the shaft, each cutter movable, outward from the shaft, from a retracted position to an extended position;


means to connect a pressurized fluid source to provide a bias force acting on each cutter toward the extended position; and

a drive operative to rotate the shaft as the shaft slides along the hole.

17. The apparatus of Claim 16 further comprising a channel defined by the apparatus adapted at an outside end of the channel for attachment to a pressurized fluid source, an inside end thereof supplying pressurized fluid to an interior of a tube.



18. The apparatus of Claim 17 wherein the cap is adapted to substantially cover the first end of the tube such that the pressurized fluid exits the tube through an opposite second end of the tube.
19. The apparatus of Claim 16 wherein the cutters are mounted on cutter bases slidably received in sockets spaced about an exterior of the shaft, and wherein the bias force is exerted against a bottom of the cutter bases.
20. The apparatus of Claim 16 wherein the means to provide a pressurized fluid source comprises a conduit extending through the shaft from an inside end connected to a bottom portion of each socket, to an outside end adapted for connection to the pressurized fluid source.
21. The apparatus of Claim 17 wherein the means to provide a pressurized fluid source comprises a conduit extending through the shaft from an inside end connected to a bottom portion of each socket, to an outside end adapted for connection to the channel such that the channel and conduit receive pressurized fluid from the same pressurized fluid source.

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22. The apparatus of Claim 16 wherein the cutters are offset along the axis of the shaft.
23. The apparatus of Claim 16 wherein at least one cutter comprises a circular member rotatably mounted about a cutter axis generally parallel to the shaft axis.
24. The apparatus of Claim 23 wherein the circular member is a circular blade having a sharpened periphery.
25. The apparatus of Claim 23 wherein the circular member has a notched outer circumference.
26. The apparatus of Claim 16 wherein the cutters are equally spaced about the exterior of the shaft.